



Red River Supply Response

Williston, ND

Air Sampling and Analysis Plan

Version 2.3

Prepared On Behalf Of:



Prepared By:

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Aug 28, 2014

Version 2.0			
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Project: Red River Supply – 14NO114CA

Location: Williston, ND

Client: Garner Environmental

Version 2.2 – 8/22; 2.1 – 8/19; 2.0 – 8/8
History:

Air Monitoring and Sampling Strategy

The strategy is to monitor potential exposures in three broadly defined areas: Work Area, Perimeter, and Community. The Work Area may be designated as the area directly surrounding the incident site and occupied by workers actively or sporadically involved in remediation and/or normal work activities. As a result of the site characterization, portions of the Work Area may be identified as areas requiring respiratory protection based on the presence of inhalation hazards. Further, job hazard analyses may be conducted which includes task based assessment of respiratory protection requirements. The Perimeter may be designated as the boundary of the facility. The Community may be designated as the area immediately surrounding the Perimeter, including residential and commercial locations.

Air monitoring involves the use of direct reading air monitors such as photoionization detectors, chemical specific sensors, and colorimetric detector tubes. Free-roaming handheld real-time air monitoring may be conducted in a variety of areas based on levels of activity, proximity to the release, and site conditions. Fixed-location handheld real-time locations may be established in the community in order to provide concentration information that may be observed and analyzed over time in distinct geographic locations in the community. Frequency of monitoring for specific analytes may vary based on changing site conditions.

Radio-telemetry RAE Systems® AreaRAE units may be deployed in all sampling zones to allow for continuous air monitoring in multiple areas. AreaRAE readings may be received and monitored in a centralized location by CTEH® personnel to allow for recognition, communication, and response to changing conditions.

Air sampling involves collecting air samples in special containers to be sent to an off-site laboratory for chemical analysis. Air samples may be collected in all three areas. These analytical air samples may be used to provide air quality data beyond the scope of real-time instruments. When necessary (e.g. substance specific standards are in effect, exposures may approach or exceed occupational exposure limits), air samples may be collected on individual workers to provide exposure data over the course of a work shift for more direct comparison to occupational exposure values.

Specific chemicals of interest, monitoring and sampling procedures may be modified as site conditions change during the remediation process. Combustion products may be monitored in the event of flare-ups.

Asbestos testing has been conducted and the absence of asbestos has been confirmed.

Night time monitoring has been eliminated due to the absence of night time operations and the AreaRAE perimeter has been eliminated due to the absence of an ongoing VOC issue.

Silica sampling (personal and area) will be deployed when concrete removal takes place.

Analytical will end when all concrete is removed.

AM510 datalogging has been discontinued because the roads are covered in dirt since the last rain and the data would be misrepresenting the dust generated from the site. It may be resumed if deemed necessary.

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Air monitoring will consist of handheld monitoring for VOCs and PM₁₀ only after the concrete is removed.

CTEH Site-Specific Action Levels

CTEH® site-specific action levels may be employed in all sampling zones to provide information for corrective action to limit exposure. These values do not replace occupational or community exposure standards or guidelines, but are intended to be a concentration limit that triggers a course of action to better address worker and public safety. CTEH is focusing on the chemicals chosen below because they may have been or may be released during remediation of this incident, and at elevated concentrations, could potentially cause adverse health effects.

Plan/Assignment: **WORK AREA**

Assessment areas: 1) Facility perimeter; 2) Frac Tank area;

Objective: Report air levels before they reach those requiring respiratory protection

Analyte	Plan	Action Level	Basis	Action to be Taken
Total VOCs	Work Area	5 ppm	EPA Emergency Responder Health and Safety Manual	Report reading to Site Management, assess work practices.
Benzene	Work Area	0.5 ppm	If VOCs are detected: OSHA PEL Action level – Reading sustained for 15 minutes	Evacuate Area or don air purifying respirator; report reading to Site Management.
Hydrogen Sulfide	Work Area	1 ppm	ACGIH® TLV – Reading sustained for 15 minutes	Evacuate Area, report reading to Site Management.
Particulate Matter (PM ₁₀)*	Work Area	3 mg/m ³	ACGIH Guideline for respirable particulate – sustained 1 hr avg.	Report reading to Site Management, If PM level is projected to remain high for a prolonged time suggest air purifying respiratory protection
Combustion Products				
Carbon monoxide	Work Area	25 ppm	ACGIH® TLV – Reading sustained for 15 minutes	Report reading to Site Management, assess work practices.

*In general, utilize correction factors to adjust for humidity for PM readings.

Plan/Assignment: **PERIMETER**

Objective: Report air levels before they reach those requiring off site response

Analyte	Plan	Action Level	Basis	Action to be Taken
Total VOCs	Work Area	1 ppm	AIHA recommendation - Reading sustained for 15 minutes	Report reading to Site Management, assess work practices.
Benzene	Work Area	0.5 ppm	If VOCs are detected: OSHA PEL Action level – Reading sustained for 15 minutes	Evacuate Area or don air purifying respirator; report reading to Site Management.
Hydrogen Sulfide	Work Area	1 ppm	ACGIH® TLV – Reading sustained for 15 minutes	Evacuate Area, report reading to Site Management.



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Particulate Matter (PM ₁₀)*	Work Area	1.5 mg/m ³	½ ACGIH Guideline for respirable particulate – sustained 1 hr avg.	Report reading to Site Management, If PM level is projected to remain high for a prolonged time suggest air purifying respiratory protection
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*In general, utilize correction factors to adjust for humidity for PM readings.

Plan/Assignment: **COMMUNITY**

Objective: Report levels that minimize nuisance levels in the community

Analyte	Plan	Action Level	Basis	Action to be Taken
Total VOCs	Comm.	1 ppm	AIHA recommendation - Reading sustained for 15 minutes	Report reading to Site Management, assess work practices.
Benzene	Comm.	Detect	If VOCs are detected: OSHA PEL Action level – Reading sustained for 15 minutes	Report reading to Site Management.
Particulate Matter (PM ₁₀)*	Work Area	.150 mg/m ³	"Moderate" AQI PM ₁₀ (24 hr avg) – sustained 1 hr avg.	Report reading to Site Management, If PM level is projected to remain high for a prolonged time assess work practices

*In general, utilize correction factors to adjust for humidity for PM readings.

Plan: **ALL – FLAMMABILITY**

Objective: Report areas where flammability is most likely

Analyte	Instrument Reading	Corrected Value	Correction Factor	Basis	Action to be Taken
LEL	1 %	1 %	NA	1% LEL Sustained 1-5 minutes	Notify Site Management

*Rough estimate based on common crude oil volatiles



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Methods

Real-Time Methods					
Chemical	Instrument	Detection Limit	Tube#/Lamp	Notes	Correction Factor
VOC	MultiRAE	0.1 ppm	PID 11.7 eV lamp	Measuring range: 1 – 5,000	NA
	AreaRAE	0.1 ppm	PID 11.7 eV lamp	Measuring range: 1 – 5,000	NA
	MultiRAE	0.1 ppm	PID 10.6 eV lamp	Measuring range: 1 – 5,000	NA
	AreaRAE	0.1 ppm	PID 10.6 eV lamp	Measuring range: 1 – 5,000	NA
Benzene	UltraRAE	0.05 ppm	PID 9.8 eV lamp	Change SEP tube frequently	0.55
	MultiRAE	0.1 ppm	PID 10.6 eV lamp	Measuring range: 1 – 5,000	0.53
	AreaRAE	0.1 ppm	PID 10.6 eV lamp	Measuring range: 1 – 5,000	0.53
	Colorimetric	0.05 ppm	Gastec tube #121L	Range: 0.1 to 10 Volume: 500 ml	1
Hydrogen Sulfide	MultiRAE	1 ppm	Sensor	Measuring range: 0 – 100 ppm	
	AreaRAE	1 ppm	Sensor	Measuring range: 0 – 100 ppm	
	MultiRAE	0.1 ppm	PID 10.6 eV lamp	Measuring range: 0 – 100 ppm	3.3
	AreaRAE	0.1 ppm	PID 10.6 eV lamp	Measuring range: 0 – 100 ppm	3.3
	MultiRAE Pro	0.1 ppm	Sensor	Measuring range: 0.1 – 100 ppm	
	Colorimetric	0.1 ppm	Gastec tube #4LL	Range: 0.25 to 2.5 Volume: 1,000 ml	1/10
LEL	MultiRAE	1 %	Sensor	Measuring range: 1 – 100%	NA
	AreaRAE	1 %	Sensor	Measuring range: 1 – 100%	NA
PM ₁₀	SidePak AM510	0.001 mg/m ³	670 nm Laser diode	PM10 impactor – 50% cut-off at 4 micron	NA
PM ₁₀	Dusttrak	0.001 mg/m ³	670 nm Laser diode	PM10 impactor – 50% cut-off at 10 micron	NA
Analytical Methods					
Analyte	Media/Can	Method	Detection Limit	Target compounds	
VOCs	Mini - Cans	EPA TO-15 with TICs	Compare to appropriate health based exposure limit	Benzene, Toluene, m,p-Xylene, 4-Ethyltoluene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, Cyclohexane, Hexane, Heptane	
BTEX (+Hexane)	3M 3520 Badge	Modified NIOSH 1500/1501	Compare to appropriate health based exposure limit	Benzene, Toluene, Ethylbenzene, Xylene, Hexane.	
Silica/Respirable dust	37 mm 5 um PW PVC 3 pc	NIOSH 7603 Grav/IR	0.005 mg	NA	
H ₂ S	Radiello radial diffusive sampler	absorbance at 665 nm	30 ppb for 1 hour exposure or 1 ppb for 24 hours exposure	NA	



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General Information on Procedures (Assessment Techniques) Used

Procedure	Description
Guardian Network	A Guardian network may be established with AreaRAEs equipped with electrochemical sensors will be positioned at established locations around the work zone. The AreaRAEs will be telemetering instantaneous data at 15-second intervals to a computer console. MultiRAE Pros may also be used in the network. The data will be visible in real-time at the computer console and will be monitored by CTEH personnel.
Hand-held Survey	CTEH staff members may utilize handheld instruments (e.g. MultiRAE Plus; ppbRAE, Gastec colorimetric detector tubes, etc.) to measure airborne chemical concentrations. CTEH will use these hand-held instruments primarily to measure the breathing zone. Additionally, measurements can be made at grade level, as well as in elevated workspaces, as indicated by chemical properties or site conditions. CTEH may also use these techniques to verify detections observed by the AreaRAE network.
Fixed Real-Time Monitoring locations	Multiple community locations may be identified and monitored at the same location approximately once per hour using hand-held instruments. This allows use statistical analysis more effectively than with a random approach.
Analytical sampling	Analytical sampling may be used to validate the fixed station and hand-held data monitoring data, or to provide data beyond the scope of the real-time instruments. Analytical samples may be collected as whole air samples in evacuated canisters or on specific collection media, and sent to an off-site laboratory for further chemical analysis.

Sampling Areas

Sampling Area	Description
Work Area	The Work Area may be designated as the area directly surrounding the incident site and occupied by workers actively or sporadically involved in remediation and/or normal work activities.
	Facility Perimeter
	Frac Tank Area
Hot Zone	The spill area within the Work Area where all major spill cleanup operations will be performed. Generally requiring a level of personal protection above that required in the general work area.
Community	The area immediately surrounding the Work Area, including residential and commercial locations where there is a potential for exposure.
Other	During the course of the remediation, some additional areas or specific tasks may require a unique set of action levels or sampling (e.g. decontamination zones, commercial zones, etc.)



Quality Assurance/Quality Control Procedures

Method	Procedure
Real-time	<ul style="list-style-type: none">• Real time instruments may be calibrated in excess of the manufacturer's recommendations.<ul style="list-style-type: none">○ At a minimum whenever indicated by site conditions or instrument readings.• Co-located sampling for analytical analysis may be conducted, if necessary, to assess accuracy and precision in the field.• Lot numbers and expiration dates may be recorded with use of Gastec colorimetric tubes.
Analytical	<ul style="list-style-type: none">• Chain of custody documents may be completed for each sample.• Level IV data validation may be performed on the first sample group analyzed.• Level II data validation may be performed on 20% of all samples.• Level IV data validation may be performed on 10% of all samples.
Other	



Change from version 1.0 to 1.1

- *Project title changed*
- *Assessment areas added*
- *Details added to analytical methods*

Change from version 1.1 to 1.2

- *Cover sheet added*
- *Signature page moved to cover sheet*
- *PM action levels changed to follow EPA Guidelines*
- *VOCs in work area changed to follow EPA Guideline*

Change from version 1.2 to 2.0 (Fires out – shift to full remediation)

- *Silica method changed to Mod. NIOSH 7603 Grav/IR*
- *Combustion products removed except for CO in the work zone*
- *Added PM₁₀ for dust particulate*
- *SO₂, asbestos, aldehydes, PAHs, metals removed from potential analytical analysis*
- *Ammonia, HCl, Amines, removed from monitoring.*

Change from version 2.0 to 2.1

- *Night shift eliminated*
- *AreaRae perimeter eliminated*
- *Target compounds adjusted for TO15 analysis*

Change from version 2.1 to 2.2

- *Analytical method added for H₂S – Radiello radial diffusive sampler*

Change from version 2.1 to 2.2

- Silica sampling (personal and area) will be deployed when concrete removal takes place.
- Analytical will end when all concrete is removed.
- AM510 datalogging has been discontinued because the roads are covered in dirt since the last rain and the data would be misrepresenting the dust generated from the site. It may be resumed if deemed necessary.
- Air monitoring will consist of handheld monitoring for VOCs and PM₁₀ only after the concrete is removed.